MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

ECE3076 – DATABASE SYSTEMS

(All Section / Groups)

10 MARCH 2020
9.00 A.M. – 11.00 A.M
(2 Hours)

INSTRUCTION TO STUDENTS

1. This examination paper consists of five (5) printed pages including cover page containing four (4) questions only.

2. Answer all questions. All questions carry equal marks (25 marks each) and the distribution of marks for each sub-question is given. The total for this paper is 100 marks.

3. Please write all your answers in the Answer Booklet provided.

Question 1

The following relational schema is provided for a computer-based certification exam database system. Primary keys for each table are in **bold** and underlined.

```
Candidate(Candidate_No, Candidate_Name)
Exam(Session_ID, Exam_Date, Start_Time, End_Time,
     Candidate_No, Attendant_ID)
Attendant(Attendant_ID, Attendant_Name, Center_ID)
Center(Center_ID, Address, Capacity)
```

Notes:

- `Candidate_No`, `Session_ID`, `Attendant_ID` and `Center_ID` are auto-incrementing `INT(10)`, while `Capacity` is `INT(1)`.
- `Candidate_Name`, `Attendant_Name` and `Address` are `VARCHAR(255)`.
- `Exam_Date`, `Start_Time` and `End_Time` are `Datetime`.

a) Write an SQL command to create the table `Exam` with proper foreign key references. Deletions from the `Attendant` are set to null while deletions for `Candidate` are set to cascade.

[7 marks]

b) Write an SQL command to add `Score`, a `DECIMAL(4,2)` field into the `Exam` table.

[2 marks]

c) All centers in Sepang district were recently renovated. Write an SQL command to update the capacity of all centers containing the keyword `'Sepang'` to 5.

[2 marks]

d) Write an SQL command to load data from `'c:\candidate.txt'` into the table `candidate`.

[3 marks]

e) Write an SQL to create a view called `Pass2019` that displays the details of candidates who passed the exam in 2019. The view should have the columns `Candidate_No`, `Candidate_Name`, `Session_ID` and `Score` that shows records with a `Score` higher than or equals 70 and the `Exam_Date` in the year 2019.

[6 marks]

f) Create a trigger `new_attempt` such that upon the insertion of a new record in `Exam`, the trigger will delete off all instances of that candidate's previous attempts.

[5 marks]

Continued...

Question 2

Your classmates get together and wish to design a study planner program that will be used to keep track of their progress in their respective courses. The following are the database requirements for the study planner:

- Each user who registers must immediately deploy or participate in a plan. The user can create up to five plans. A plan must belong to at least one user, but can be shared to up to ten people.
- A plan must consist of at least one item. Additional items can be added in subsequently. Due to limitations of the system, each plan can only accommodate a maximum of 50 items.
- It is optional for a plan to be assigned a supervisor. A plan may have at most one supervisor. A supervisor is included in the system the moment they are assigned a plan to supervise. A supervisor can supervise many plans.
- Items with different categories have different data characteristics. Therefore, you decide to divide them into tasks, events or notes. Each item entered must belong to only one category.

a) Using either Chen's OR Crow's foot notation, draw an ER diagram to represent the conceptual model for the database based on the rules above. You must indicate all possible connectivity and cardinality information in your diagram. Also include Extended ER notation wherever applicable.

[18 marks]

b) Identify and resolve any M:N relationships found in the case study above by drawing an ER diagram for each resolved relationship. Remember to indicate all connectivity and cardinality information in the diagrams.

[7 marks]

Continued...

Question 3

a) Given the dependency diagram Figure 3(a) below, answer the following questions:

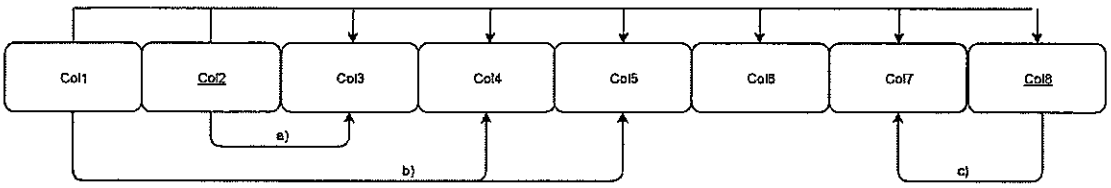


Figure 3(a)

i) List the primary keys and label the dependencies a), b) and c).

[2+6 marks]

ii) Explain why attribute Col6 does not have a dependency arrow.

[2 mark]

iii) What is the requirement for normalization to the second normal form (2NF)?

[2 mark]

iv) Show the relations after normalizing the table to **third normal form (3NF).**
[Hint: You may use alphabets for relation names. You do not need to show 2NF.]

[4 marks]

v) Table 3(b)(i) and Table 3(b)(ii) represent the relations **Student** and **Majors** respectively. The corresponding **primary key** of each table is bold and underlined. **Major_Code** from **Table 3(b)(i)** references **Major** from **Table 3(b)(ii).**

Stud_ID	**Stud_Name**	**Major_Code**
1	Cindy Khoo	NT
1	Bala Muthusamy	CE
2	Ahmad Mutalib	CD
3	Nelson Tan	AD
4	Mahmoud Sayeed	TA
5	Harold Kok	NULL

Table 3(b)(i): Student

Major	**Stream**
CE	Science
NT	Science
AD	Sports
TA	Arts
BC	Arts

Table 3(b)(ii): Major

i) Does Table 3(b)(i) satisfy entity integrity? Explain your answer.

[3 marks]

ii) Does Table 3(b)(ii) satisfy entity integrity? Explain your answer.

[3 marks]

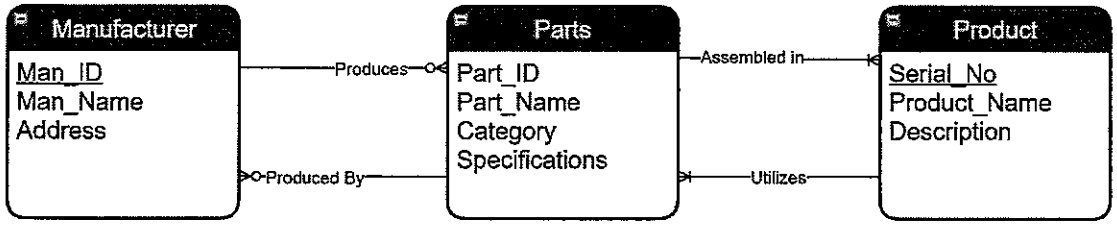
iii) Does the relationship between Table 3(b)(i) and Table 3(b)(ii) satisfy referential integrity? Explain your answer.

[3 marks]

Continued...

Question 4

a) Convert the following Crow's Foot ERD into its object oriented UML equivalent representation.



[15 marks]

b) The following **Table 4(b)** depicts a scenario with several transactions from different users and the data items locked and required by each transaction.

Transaction	Data Items Locked	Data Items Required
T1	X5,X21,X22	X1, X6
T2	X16, X17, X18	X2,X8, X9
T3	X2,X8,X10	X3,X13
T4	X9,X12,X20	X4
T5	X3,X4,X13	X6,X11
T6	X1,X6,X11	-
T7	X4,X10,X13,X19	X2,X3
T8	X7,X14,X15	X19

Table 4(b)

Draw a wait-for graph. Indicate the transactions that are causing the deadlock if any.

[5 marks]

c) Given the following phases of the database life cycle, match the descriptions in **Table 4(c)** with the correct phase in the database life cycle (DBLC).

DBLC phases in sequence:

Database Initial Study->Database Design->Implementation and Loading->
Testing and Evaluation->Operation->Maintenance and Evolution.

Item	Description	Phase
i)	Create the conceptual design and select DBMS software.	
ii)	Testing and fine-tuning the database.	
iii)	Introduce changes and make enhancements.	
iv)	Installation of the DBMS and creation or import of data.	
v)	Analyze company situation and define problems, constraints, objectives, scope and boundaries.	

Table 4(c)

[5 marks]

End of paper